

Vietnamochloa aurea (*Gramineae* : *Eragrostideae*),
a new genus and species from Vietnam

J.F. VELDKAMP & R. NOWACK

Summary : Description, morphology, and leaf anatomy of a new monotypic grass genus from Vietnam.

Résumé : Description, morphologie et anatomie foliaires, d'un genre nouveau monotypique de *Gramineae* du Vietnam.

J.F. Veldkamp and R. Nowack, Rijksherbarium, POB 9514, 2300 RA Leiden, The Netherlands.

A grass collection from Phan Rang, Vietnam, proved to be unidentifiable with various treatments for S.-E. Asia and beyond. It clearly belongs to *Eragrostideae-Cynodonteae* in view of the general leaf histology (Kranz anatomy, absence of midrib, etc.), the 3-nerved lemmas, the S-shaped palea, and the shape and structure of the caryopsis. The specimen is especially conspicuous by the paniculate, non-digitate inflorescence with solitary, pedicelled, 1-flowered spikelets, the 1-nerved glumes longer than the lemma, the presence of a naked rachilla process, the golden pubescence of the back and margins of the 3-nerved lemma and on the nerves of the palea, the presence of a sharp, obconical, hairy callus, and the small, straight awn on the lemma.

DELTA (version May 1991) (cf. DALLWITZ, 1980 ; WATSON, DALLWITZ & JOHNSTON, 1986 ; WATSON & DALLWITZ, 1988) is a powerful computer program for comparing genera and identifying unknown specimens. Running the characters of the specimen in it suggested close similarity to *Gymnopogon* Beauv. and less so to some other genera.

The genus *Gymnopogon* is centred in the New World where it has 14 species. A fifteenth, *G. delicatulus* (C.B. Clarke ex Hook. f.) Bor, occurs in continental S.-E. Asia from India to South Vietnam.

Our specimen differs from material of *Gymnopogon* in a number of features. The leaves are aggregated mainly basally rather than distichously spaced along the culm. Their margins are pectinate, not glabrous. The ligule is not a ciliate-margined membrane but a row of hairs (although it is possible that the membrane is very much reduced). The inflorescence is a panicle composed of racemes, although some might consider these as spikes, as the spikelets are shortly pedicelled, which is also the case in *Gymnopogon* where the pedicels are even shorter in the species that we could examine. The spikelets are 1-flowered, while the rachilla extension bears no trace of remnants of higher florets ; in *Gymnopogon* there are usually vestiges of lemmas or awns, but they may be absent in e.g. *G. brevifolius* Trin., *G. burchellii* (Doell) Ekman, *G.*

chapmannianus Hitchc., *G. fastigiatus* Nees subsp. *fastigiatus*, and *G. floridanus* Swallen. The lemma is dorso-ventrally flattened in our specimen, in *Gymnopogon* it is flattened laterally. A conspicuous feature is the golden pubescence of the back and margins of the lemma and on the nerves of the palea, a kind of pubescence not seen or reported elsewhere. The palea is distinctly S-shaped, while it is lanceolate in *Gymnopogon*. The caryopsis in the species of *Gymnopogon* is fusiform and dark brown to blackish, while in the Vietnamese specimen it is obovate and cinnamon; the embryo in *Gymnopogon* is 0.25-0.3 times as long as the caryopsis, it is 0.37-0.5 times as long in our specimen.

Other genera with a lesser degree of similarity to the new taxon include *Brachyachne* (Benth.) Stapf, *Leptochloa* Beauv., and *Muhlenbergia* Schreb.

Brachyachne differs by the digitate inflorescence, sessile spikelets, mucicous to mucronate lemmas, laterally compressed caryopses, and blades that are "nodular" in transverse section, among other features.

Leptochloa (incl. *Diplachne* R. Br.) differs by having blades with a distinct midrib and "nodular" in cross-section, rarely 1-, usually 2-20-flowered spikelets, glumes distinctly shorter than the adjacent lemmas, an absent to much reduced rachilla-process, and lemmas with a blunt callus and apex.

Muhlenbergia differs in several respects as well, notably a rachilla terminated by a floret, and a fusiform to ellipsoid, not noticeably compressed caryopsis. No annual species of this genus are known outside the New World. These, moreover, according to PETERSON & ANNABLE (1991), all have a membranous ligule which may be short in *M. ciliata* (H.B.K.) Kunth, *M. pectinata* C.O. Goodding, and *M. tenella* (H.B.K.) Trin. However, these species are quite different from our specimen, having very short glumes, long-awned lemmas, etc. Glumes that are longer than the lemma occur in *M. annua* (Vasey) Swallen and *M. majalcensis* P. Peterson, but both are quite distinct from the Vietnamese plant by their much smaller spikelets, no awn at all, etc.

All these differences suggest to us that an undescribed genus and species are involved, *Vietnamochloa aurea*.

According to M. SCHMID (P), Phan Rang has a high rate of endemism because of its climatological and geographical situation. The coastal area is extremely dry (600-700 mm) and the sandy and stony interior is semi-arid. Many other *Eragrostideae* occur here, e.g. *Kengia serotina* (L.) Packer.

VIETNAMOCHLOA Veldk. & Nowack, *gen. nov.*

Lamina anatomia Kranziana gerentia, ligula ciliarum fimbria minuta truncata, inflorescentiis paniculatis non-digitatis, axe commune bene evoluto, racemis tenacibus, spiculis solitariis pedicellatis unifloris, supra glumas frangentibus, glumis 1-nervatis lemmate longioribus textura plus minusve eadem, processo rachillae filiformi inappendiculato, lemmate 3-nervato dorsaliter secus costa duabus seriebus setis aureis et secus margines aureo-setuloso, callo acuto obconico aureo-ciliato apice acuminato, arista subapicali minuto stricto, palea S-formi nervibus 2, caryopside obovoidea dorso-ventraliter compressa pericarpio adnato cinnamomeo laevi, embryone caryopside 0.37-0.5-plo longior.

TYPE : *Vietnamochloa aurea* Veldk. & Nowack.

Culms distally unbranched. Blades not pungent, with Kranz anatomy. Ligule a short, ciliate rim. Panicle of loosely flowered tenaceous racemes along a well-developed common axis. Spikelets solitary, 1-flowered, fusiform, slightly dorsally compressed, breaking up above the glumes. Glumes subequal, 1-nerved, keeled, longer than the lemma, more or less the same in texture. Rachilla process present, glabrous, smooth, without apical vestiges. Lemma dorso-ventrally flattened, rounded on the back, 3-nerved, lateral nerves submarginal, golden setulose from base, midrib on both sides with a row of golden, stiff hairs; callus obconical, pungent, laterally short golden hairy; apex acuminate, awn subapical, simple, straight. Palea S-shaped, nerves 2. Lodicules not seen. Anthers 3. Styles 2, free. Caryopsis obovate, dorso-ventrally flattened, pericarp adnate, cinnamon coloured, smooth; embryo 0.37-0.5 times as long; hilum subbasal, punctiform.

Vietnamochloa aurea Veldk. & Nowack, *sp. nov.* — Fig. 1, 2.

Annua ad 25 cm alta glabra, foliis praecipue basalibus caulinis 1 vel 2 diminutis, vaginis ad basin apertis glabris valde nervatis, ligula ca. 0.25 mm longa, laminibus ovato-lanceolatis planis ad involutis 0.5-1 cm longis 1.5-2 mm latis acutis marginibus pectinatibus setis rectis distantibus ad 0.7 mm longis cetera glabris, pedunculo ad 15 cm longo laevi glabro, panícula laxa angusta 3.5-5 cm longa ca. 1 cm lata, ramis laxe erectis paucifloris infimis solitariis, pedicellis 0.5-1 mm longis, spiculis 4-4.25 mm longis (arista exclusa), glumis lanceolatis acutis glabris laevibus viridibus distaliter purpurascens, inferioribus 3.5-4 mm longis superioribus 3.9-4.1 mm longis, processo rachillae ca. 1.5 mm longi glabro laevi, lemmata lanceolata 3-3.2 mm longa, setis strictis rigidis ca. 0.2 mm longis, costa inconspicua, arista subapicali inserta breviter exserta 1.5-1.75 mm longa, callo 0.5-0.75 mm longo, palea ca. 3 mm longa aureo-setulosis setis ca. 0.3 mm longis, antheribus ca. 1.5 mm longis, caryopside ca. 1.5 mm longa ca. 0.75 mm lata.

TYPE : *Nguyen Van Khiem s.n.*, Vietnam, Phan Rang, 3.XI.1965 (holo-, L, n° 000201; iso-, possibly in the Herbarium of the Faculty of Science, Saigon).

Caespitose annuals. Culms up to 25 cm high, glabrous. Leaves mainly basal, 1 or 2 cauline, reduced. Sheaths open to base, glabrous with strong prominent ribs. Ligule ca. 0.25 mm high. Blades ovate-lanceolate, flat to inrolled, 0.5-1 cm by 1.5-2 mm, acute, margins pectinate with straight, distant bristles of up to 0.7 mm length, otherwise glabrous. Peduncle up to 15 cm long, smooth, glabrous. Panicle lax, narrow, composed of a few subracemose spikes, 3.5-5 by 1 cm, branches laxly erect, few-flowered from the base, lowermost ones solitary. Pedicels 0.5-1 mm long. Spikelets 4-4.25 mm long (excl. awn). Glumes lanceolate, acute, glabrous and smooth, green to distally purplish. Lower glumes 3.5-4 mm long; upper glumes 3.9-4.1 mm long. Rachilla process ca. 1.5 mm long, glabrous, smooth. Lemma lanceolate, 3-3.2 mm long, bristles straight, ca. 0.2 mm long, midrib faint, awn shortly exserted, 1.5-1.75 mm long; callus 0.5-0.75 mm long. Palea slightly shorter than the lemma, deeply bilobed in upper part, ca. 3 mm long, golden setulose in the lower 2/3d, bristles ca. 0.3 mm long. Anthers ca. 1.5 mm long. Caryopsis ca. 1.5 by 0.75 mm.

DISTRIBUTION : S. Vietnam, Phan Rang, only known from the type.

HABITAT : Dry sandy, clayey soil.

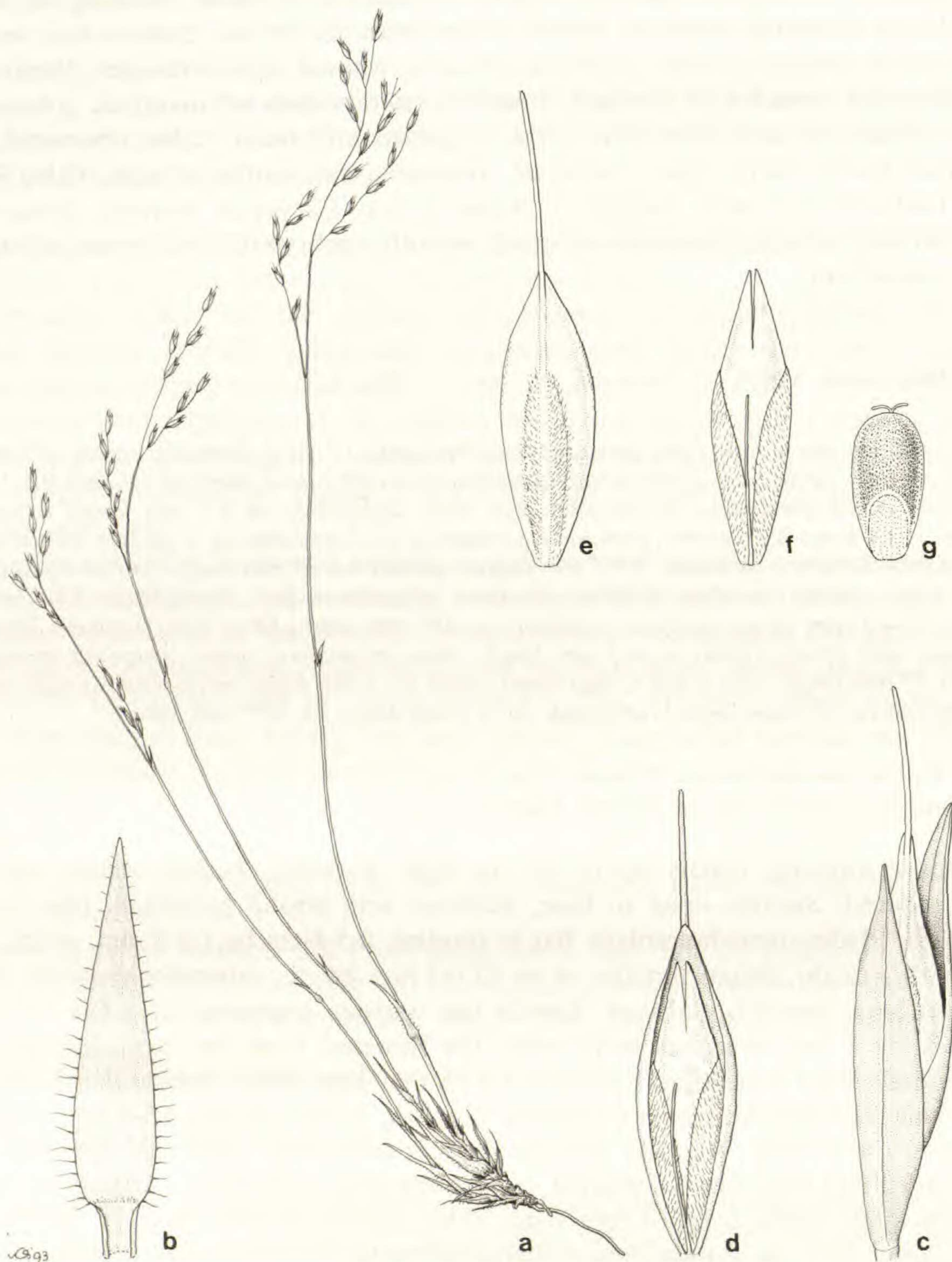


Fig. 1. — *Vietnamoschloa aurea* Veldk. & Nowack : **a**, habit ; **b**, leaf blade axial side, note absence of midrib ; **c**, spikelet abaxial ; **d**, floret, adaxial ; **e**, lemma, dorsal ; **f**, palea and rachilla ; **g**, caryopsis, abaxial. *Nguyen Van Khiem s.n.* (L). — **a** \times 1 ; **b** \times 3 ; **c-g** \times 12.

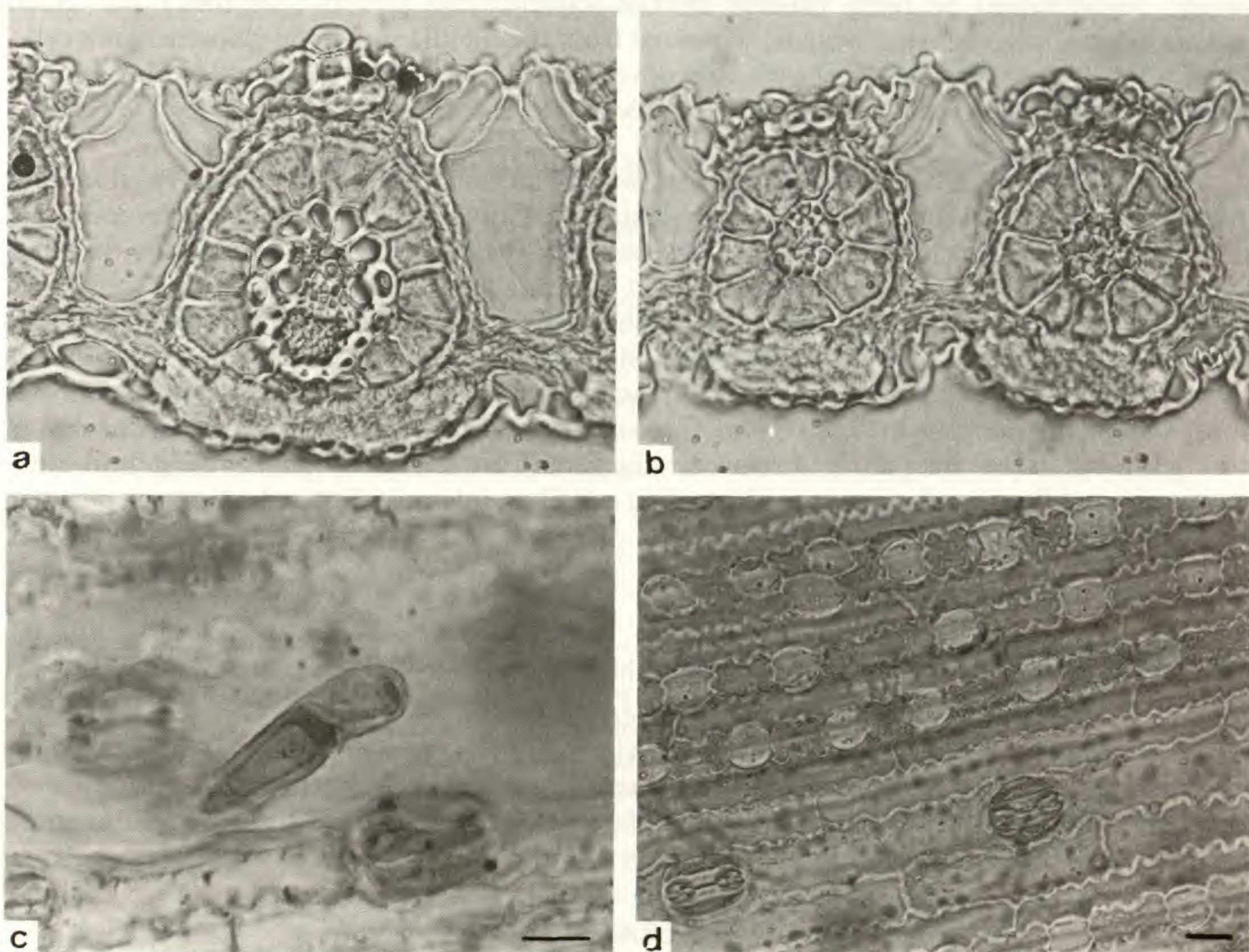


Fig. 2. — *Vietnamochloa aurea* Veldk. & Nowack : **a**, transverse section of leaf showing major bundle with inner bundle sheath ; **b**, *id.*, showing two minor bundles without inner bundle sheath. **b** = bulliform cell, **s** = sclerenchyma anchor ; **c**, abaxial epidermis of the leaf blade with intercostals and chloridoid micro-hair (bar is 10 μ m) ; **d**, abaxial epidermis of the leaf blade with costals and intercostals (bar is 10 μ m).

ANATOMY :

Transverse section of leaf blade. — Leaf blades C4, XyMS+. Massive prickly hairs present on the margin. Microhairs chloridoid, scattered over the ad- and abaxial surfaces. Lamina abaxially ribbed with grooves between the vascular bundles ; adaxially more or less flat. Stomata scattered over the adaxial surface, abaxially confined to the grooves. Adaxial epidermal cells more or less oval and flattened ; abaxially papillate. One large, adaxial bulliform cell, flanked by smaller colourless cells between each pair of vascular bundles to form deeply-penetrating fans (Fig. 2). Mesophyll not conspicuously radiate, possibly compressed due to drying, without adaxial palisade, not traversed by colourless columns. Blade with distinct, prominent adaxial ribs ; midrib not readily distinguishable, with one bundle only. Vascular bundles 21 with conspicuous outer bundle sheaths (PCR) of even outline, sheath extensions

absent, accompanied by fairly massive abaxial sclerenchyma girders ('anchors') and much smaller adaxial sclerenchyma strands, separated from the bundle sheath by chlorenchyma cells. Inner sclerenchymatous bundle sheath only developed in four "major" bundles. Margin with a well-developed sclerenchymatous fibre bundle. — P. BAAS.

Abaxial leaf blade epidermis. — Costal/intercostal zonation conspicuous. Papillae and glands absent. Long-cells similar in shape costally and intercostally (broader intercostally); mid-intercostal long-cells rectangular with markedly sinuous walls. Microhairs present, chloridoid, clearly two-celled, elongated, 24-30 μm long, ca. 6 times wide as long, basal cell 18-21 μm long, ca. 0.3 times as long as the whole hair, apical cell thinner than basal cell, but not collapsed, 9-12 by 6 μm wide at septum. Stomata common, ca. 15 μm long; subsidiaries non-papillate, dome-shaped; guard-cells overlapping to flush with the interstomata. Costal short-cells conspicuously in long rows; intercostal short-cells common but few, mostly in cork/silica-cell pairs, irregularly dispersed, silicified. Costal silica bodies present and well-developed, saddle-shaped, present in alternating cell files; intercostal silica bodies conspicuous, few, tall and narrow. Prickles and macro-hairs present on the blade margins, only. — A. VAN DEN BORRE.

ACKNOWLEDGEMENTS : We wish to thank Mr. NGUYEN VAN KHIEM for the many interesting collections he used to send from Vietnam, of which this is one. Ms B. VAN HEUVEN (L) carefully sectioned and photographed the leaf blades from which Prof. P. BAAS (L) prepared a description. Mr. M. SCHMID (P) gave very helpful advice on Indochinese agrostology. Dr. L. WATSON and Ms. A. VAN DEN BORRE (Canberra) kindly ran our description against their latest version of DELTA in our search for a generic identity. Ms. VAN DEN BORRE kindly allowed us to use her description and plates of the abaxial epidermis of the leaf blade. Mr. J. VAN OS (L) is thanked for making the line-drawing.

LITERATURE

- DALLWITZ, M. J., 1980. — A general system for coding taxonomic descriptions. *Taxon* 29 : 41-46.
- PETERSON, P. M. & ANNABLE, C. R., 1991. — Systematics of the annual species of *Muhlenbergia* (*Poaceae-Eragrostideae*). *Syst. Bot. Monogr.* 31 : 1-109.
- SMITH, J. P., 1971. — Taxonomic revision of the genus *Gymnopogon* (*Gramineae*). *Iowa State J. Sc.* 45 : 319-385.
- WATSON, L. & DALLWITZ, M. J., 1988. — *Grass genera of the world*. 45 pp, 5 microfiches. Australian National University, Canberra.
- WATSON, L., DALLWITZ, M. J. & JOHNSTON, C. R., 1986. — Grass genera of the world : 728 detailed descriptions from an automated database. *Austral. J. Bot.* 34 : 223-230.